

A pamphlet containing several papers by Baron Mueller and Prof. Tate on the Flora of North and South Australia; also a pamphlet containing "Notes on the Tertiary Strata beneath Adelaide," "Diagnoses of new species of Miocene Fossils from South Australia," and "Land and Freshwater Molluscs of Tropical South Australia." By Prof. Ralph Tate, F.G.S.

"Abhandlungen aus dem Gebiete der Naturwissenschaften herausgegeben vom Naturwissenschaftlichen Verein von Hamburg-Altona," VII Band., II Abtheilung, 4to, 1883. From the "Verein."

"Systematic Census of Australian Plants, with Chronologic Literary, and Geographic Annotations." By Baron Fred. von Mueller, K.C.M.G., M.D., F.R.S., &c., Part I, Vasculares. From the author.

PAPERS READ.

OCCASIONAL NOTES ON PLANTS INDIGENOUS IN THE IMMEDIATE
NEIGHBOURHOOD OF SYDNEY. (No. 3.)

By E. HAVILAND.

During the short discussion that followed the reading of my last paper, I quoted some remarks, by Professor Asa Gray, on the fertilization of certain plants. As in those observations, he mentions *Lobelia*, I have made that genus the subject of this short paper.

Bentham gives, in the *Flora Australiensis*, a list of eighteen species of the genus indigenous in Australia; but he mentions, that it is widely spread over North America and South Africa; with a few species in Europe; while none had been found in Northern Asia. The eighteen Australian species, he divides into two sections. The first, consisting of ten species, having all the

anthers crested by a tuft of stiff short hairs. The second of eight species, having only the two lower anthers so crested. This second section he again divides into two. The first sub-division, containing five hermaphrodite species; the second, three species, which are more or less unisexual; although, in reality, they have both stamens and pistils; one or the other, however, being abortive. As an instance, he specially refers to *L. dioica* (a Northern Queensland species), the male flowers of which have the female organs perfect, so far only, as the stigma is concerned, but the ovary is short, and the ovules are abortive; the stamens and anthers, or male organs, are, however, perfect in every respect; producing perfect, fertile pollen, while the female flowers of the same species, have the female organs, ovary, style and stigma perfect; but the stamens, or male organs, although present, are rudimentary only, producing no pollen. This species, therefore, as well as the two others in this sub-division. *L. purpurascens* and *L. pratioides*, are, although possessing in each flower, to a certain degree, both male and female organs, virtually unisexual.

The genus is placed by Bentham in the order Campanulaceæ, but by most other botanists in a separate order, Lobeliaceæ; leaving Campanulaceæ for those plants having regularly-shaped corollas.

As my notes from which I write this paper, have been made from the examination of several species, excepting, however, for the present, those that are unisexual, I give the generic description only: not the specific characters of any individual member of the genus

LOBELIA.

“Calyx tube hemispherical, turbinate, ovoid or rarely linear; limb of five lobes, open or reduplicate, valvate in the bud. Corolla slit open on the upper side to the base; five lobed, the two upper lobes usually shorter, more deeply separated and erect or curved upwards, forming a more or less distinct upper lip. Stamens inserted at the base of the corolla, sometimes very shortly adnate to it; the filaments often united above the middle; the anthers

united in an oblique or slightly incurved tube round the style. Ovary two celled. Stigma broadly two lobed and often surrounded by a ring of retractile hairs. Capsule opening loculicidally within the calyx lobes in two valves : rarely splitting longitudinally below the calyx lobes also. Herbs, often acrid with a milky juice. The Australian ones either annual, or creeping and rooting at the base. Pedicels one flowered, either axillary or terminal, or in terminal racemes, sometimes having two small bracteoles, which however, are never constant in the same species. Flowers in a few species diœcious by the abortion or sterility of the anthers in the females, and the malformation of the undivided stigma, and abortion of the ovules in the males." I have been fortunate this season, in being able to examine and study a great number of *Lobelias*. On the mountains, at least as far as Springwood, as well as on the coast, they have been unusually plentiful. Those on the coast I have found chiefly at Curl Curl, which is the next bay north of Manly. Perhaps I may be allowed to digress here, just to say, for the benefit of other botanists that, leaving Manly by the Pittwater road, and after a walk of about a mile, turning to the right up a steep rough hill road, known in the locality as Rose Hill, following from the top of the hill, the fence running east to the ocean, then along the beach to a creek flowing into the sea, along the winding of the creek back to the Pittwater road, and thence to the point of starting ; the boundaries of a piece of country will be traversed of between three and four square miles in extent ; very rich indeed in specimens of our coast flora. Here, in their respective seasons, may be found *Utricularia*, *Xyris*, four or five different species of *Boronia*, *Blandfordia*, *Goodenias*, and a vast number of other plants of great interest to the botanist. Of the *Lobelias*, I have found in this locality, during the present summer *L. anceps*, *L. gracilis*, *L. gibosa*, and *L. debilis* (of the last however only one plant). From my notes of these, as well as of those examined in the mountains, especially with regard to their fertilization, I find the same process going on in all. Taking a flower of which the corolla has recently opened, the filaments of the stamens can be seen open and separated from each other at

the base, but connected at the top; the anthers forming a comparatively long fluted cylinder, so closely adnate, that considerable force with the dissecting needle is needed to separate them. In fact I have rarely succeeded in doing so cleanly, one anther generally tearing away part of its neighbour rather than separate from it. No trace of the apex of the pistel can be seen; it is, as yet, so completely closed in at the bottom of this anther tube. Choosing a more advanced specimen, pollen may be seen just beginning to emerge from the top of the tube. In one still more advanced the pollen is seen crowded out of the tube and falling over its side. In another the point of the style can be seen emerging from the tube, and following the pollen which it has pushed before it. When the style has so far advanced that its apex is quite clear of the anther tube, it will be observed that it is crested with short stiff hairs or bristles, which there is no doubt have been used as a brush to sweep the pollen before it. I have not, myself, as a rule, found the style retaining any of the pollen, except occasionally a grain or two. It appears to accumulate on, and cling for a short time, to the outside of the anther tube, allowing the apex of the style to pass beyond it. Examining other and still more mature flowers; the style will be found projected to different distances, from one to three-eighths of an inch beyond the anthers, but no trace of a stigma can be found, and it will be noticed by this time, that in almost every case the pollen has entirely disappeared. It is now that the apex of the style splits into two rather broad spreading lobes, and it will be seen that the inner surfaces of these lobes form the stigmas, which having been enclosed within the style, till all the pollen from their own flower had disappeared, are at last exposed to the visits of pollen bearing insects. As, however, a small portion of pollen is generally left inside the anther tube after the style has escaped, I thought it not unlikely that, at a subsequent period, and after the lobes of the style had opened exposing the stigmas, the anthers would also separate exposing the residue of the pollen. In such case an insect would, in passing from the anthers to the stigmas, undoubtedly self-fertilize the flower. I have, however, found no

instance in which the anthers have so separated, although I have watched especially for it from the maturing to the withering of the flower. Even, however, if it should happen in an isolated case, the stigmas would have been so long exposed in a mature state to the visits of insects as to make it more than probable that fertilization by their aid would have been already accomplished.

There is often much difficulty experienced in identifying the various species of this genus, as they frequently approach each other very closely—much assistance may, however, be gained by careful inspection of the anthers, as to whether they are all or only a portion of them crested; and also by closely examining the seeds (which are very small) with a low microscopic power, some species having them smooth; others with three prominent angles, and some even winged.

As to the *Lobelia* as a plant for domestication, I suppose the Amateur Gardener could find none amongst our Australian flora more easy to cultivate—massed together in groups in a bush house or fernery, it has a very beautiful effect. In the summer of 1880 I took home from Manly a small plant of *Lobelia gracilis*. I did not intend, at the time, to cultivate it, but to dry it for the herbarium, I did not therefore remove it as carefully as I should have done; the roots, in consequence, being considerably injured. I was however induced to plant it and take the chance of its growing. For a long time it struggled between life and death, till at last, in the spring of the following year, it started into vigorous growth and in a few weeks had become such a beautiful object that friends used to call especially to see it. At one time I counted one hundred and seventy-eight flowers upon it, and yet it was only a plant of sixteen inches in height, and it remained with a succession of flowers in this state all the summer.

All the species produce seeds in abundance, which may be readily collected in the bush, and there is no difficulty in raising strong healthy plants from them, but the plants must be kept moderately dry, as they are liable, as gardener's say, to "damp off," if unduly watered.